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ABSTRACT

College students in a reading rate improvement course participated in a study (1) to determine the effects of text displayed on the computer screen as opposed to the printed page and (2) to see if computerized speed reading programs changed student attitudes toward reading efficiency exercises. Subjects, 26 students of similar reading comprehension abilities, either read entire passages displayed on computer screens and had the computer record their reading rate (the experimental group) or read printed pages and recorded their reading rate themselves (the control group). The students using computers read entire passages because word-by-word presentation has been shown to adversely affect reading efficiency. Each group read the same passages weekly, answered the same comprehension questions afterwards, and then calculated their own reading efficiency. To measure reading improvement, the Fast Reading section of the Stanford Diagnostic Reading Test was used as pretest and posttest. Results indicated that the form of presentation did not matter--students' reading efficiency improved because of practice in reading complete passages under self-controlled, timed conditions. In addition, when student attitudes toward the rate component of the reading program were tested by administering a course evaluation survey, both the computer group and the traditional group rated their mode of presentation highly, which shows that they perceived the direct practice with whole-text rate exercises as helpful, regardless of mode of presentation. (A copy of the evaluation survey is appended.) (SKC)

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Rate Improvement in College: The Computer vs. Traditional Text

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The major purpose of this study was to determine the effects of computer screen displayed text vs. traditional printed page on college students' reading efficiency as measured by the Fast Reading subtest of the Stanford Diagnostic Reading Test. A second purpose was to investigate whether those students exposed to a computerized speed reading program would indicate significant attitudinal differences towards reading efficiency exercises.

Rationale for Study

Minimal research is available which has investigated college students' improved reading efficiency with computer screen displayed text as compared to traditional printed page text. Any available studies usually focus on perceptual exercises that train the eyes to move rapidly across the page or use different content material and procedures for comparing the effects of computerized text with traditional text on reading efficiency (McConkie, 1984).

As a result, it is difficult to assess the beneficial effect of computerized speed reading programs and to isolate what aspects of these speed reading programs could be contributing to any improvement in reading efficiency. This study used the same content and procedures (i.e., methods for controlling reading rate of whole text) provided by a computerized speed reading program to determine whether college students' reading efficiency differs when using computerized displayed screen text as opposed to traditional printed page text. Aware of McConkie's findings (1984), that the eyes cannot be "trained" to move along text by means of flashed perceptual exercises, we used only the whole text, paragraph reading parts of the program with both groups, varying only the mode of delivery.

Methods and Procedures

Twenty-six college students from one section of the College Reading and Rate Improvement course (a 1/2 semester course designed to help college students improve comprehension, study skills and reading rate) were involved in the study. Students were assigned randomly to the experimental and

control conditions on the first day of class. Normal attrition caused by course withdrawals affected the experimental more than the control group, with the final numbers being 11 (6 males, 5 females) subjects in the experimental group and 15 (5 males, 10 females) subjects in the control group. (Table 1). Based on the comprehension scores of the New Jersey College Basic Skills Placement Text (NJCBSPT), the two groups were not significantly different in general reading comprehension at the start of the study (Experimental: $\underline{M}$=31.36, $\underline{SD}$=1.74; Control: $\underline{M}$= 30.20, $\underline{SD}$=3.89; $t_{(25)}$=.99)

Table 1

Distribution of Subjects

	Male	Female	Total
Exp	6	5	11
Control	5	10	15
Total	11	15	26

Each week students were assigned to read the same passages for improving reading efficiency. It should be noted that the passages and questions from a commercially prepared computerized speed reading program were printed out for the control group so that both groups were using the same material.

Rate of reading scores were recorded similarly for both groups. The experimental group used computer screen displayed text; the control group used traditional printed page text. Both groups had control over their rate of reading. The experimental group, presented with a full page of text on the computer screen, were able to control reading rate by pressing the keyboard's space bar each time the display of a new screen of text was desired;

their rate of reading was recorded by the computer program. The control group read the printed pages until finished, at which time they recorded their rate according to the instructor's notations on the chalkboard.

The same questions used to assess comprehension were used for both groups. Reading efficiency was assessed similarly for both groups. Once a passage was completed, students recorded their Words Per Minute (WPM) reading rate, answered and scored a series of literal and higher level comprehension questions, and then calculated their reading efficiency (a combination of speed and comprehension).

The Fast Reading section of the Stanford was used for pre- and post-testing. To assess attitudinal differences between the experimental and control groups, an evaluation survey, developed by the researchers, was administered to both groups immediately before the posttest.

Results

To see if there were any transfer effects of the rate training under the two conditions, the pre- and post-test scores of the Fast Reading Subtest of the Stanford Diagnostic Reading Test, Form H, were subjected to a repeated measures analysis of variance (Sex X Treatment X Trials). According to the ANOVA source table (Table 2) there were no significant main effects or interaction effects; only the difference between trials (trial 1 = pre-test; trial 2 = post-test) was significant ($p < .001$).

Table 2

Analysis of Variance Table for Fast Reading

Subtest of the Stanford Diagnostic Reading Test

Source	Sum of Squares	DF	Mean Square	F-Test	Significance
Sex	6.601	1	6.601	0.229	Over 0.500
Treatment	28.520	1	28.520	0.989	0.331
Sex X Treatment	1.841	1	1.841	0.064	Over 0.500
Unit	634.144	22	28.825	Not Tested	
Trials	542.708	1	542.708	49.286***	Under 0.001
Sex X Trials	1.268	1	1.268	0.115	Over 0.500
Treatment X Trials	9.187	1	9.187	0.834	0.371
Sex X Treatment X Trials	6.308	1	6.308	0.573	0.458
Trials X Unit	242.250	22	11.011	Not Tested	
Total	1472.826	51	28.879		

Table 3 shows the means for the experimental (computer-display) and the control (traditional print) groups. While the computer group went from a mean of 17.97 to a mean of 25.57, the traditional print group went from a mean of 17.30 to a mean of 23.15. Although the post-test mean for the computer group was higher than that of the traditional print group, the difference was not significant. The gain made by the total group, 17.63 (pre) to 24.36 (post) was significant ($F = 49.27$, $p < .001$). All students, regardless of condition, made real gains in rate as measured by a standardized test. These results appear to indicate that rate improvement exercises, whether by traditional or computerized exercises, can improve reading efficiency and that students transfer their improved efficiency to reading materials other than the practice exercises.

Table 3

Pre- and Post-Test Means: Fast Reading Subtest of the Stanford Diagnostic Reading Text

Condition	N	Trial 1 (Pre)	Trial 2 (Post)
Experimental	11	17.97	25.57
Control	15	17.30	23.15
Total	26	17.63	24.36

To evaluate their attitudes toward the reading program, in general, and the rate component specifically, students were asked to complete a course survey (Appendix A) at the last session. The items about the rate component were embedded in the survey to minimize attention to the experimental variable. The results are reported in Tables 4 and 5.

The items were rated on a four-point scale, with four being high. According to Table 4, both groups rated their degree of improvement in reading skills from To some extent to Greatly (means ran from 2.36 to 2.93). It is interesting to note that the computer group rated their improvement in rate of reading higher than did the control group, 2.73 vs. 2.36.

Table 4

Course Evaluation: College Reading and Rate Improvement

Item	Computer Group N=11	Traditional Text Group N=15
A. To what extent do you think this course has helped you to improve--	(Very greatly = 4; Greatly = 3; To some extent = 2; Not at all = 1)	
1. General comprehension	2.64 (.79)	2.93 (.80)
2. Study skills	2.45 (.78)	2.64 (.72)
3. Rate of reading	2.73 (.45)	2.36 (.48)
B. To what extent did you find the following course components helpful?	(Very helpful = 4; Helpful = 3; Of some help = 2; Of no help = 1)	
1. Text	2.81 (.45)	2.78 (1.01)
2. Novel (The Jungle)	2.91 (.67)	2.71 (.79)
3. Newspaper reading	2.36 (.88)	2.21 (.94)
4. Rate exercises	3.27 (.62)	2.92 (.80)
a. Content of exercises	3.18 (.91)	2.64 (.61)
b. Method of presentation	3.36 (.48)	3.21 (.56)

Table 5

Interest in Using the Computer for Reading Development
(Computer Group Only; N=11)

Question	All the time	Some of the time	Never
Given the opportunity, I would use the computer for reading development	63.6%	36.3%	0%

When asked to evaluate the course components, students indicated that they found them generally helpful (means from 2.21 to 3.36), with the rate components receiving most of the highest scores. Specifically, Table 4 shows that the computer group was more positive about the rate component ($\underline{M}$ = 3.27) than was the control group ($\underline{M}$ = 2.92). Also, they were more positive about the content of the rate exercises, despite the fact that both groups read the same materials although on different delivery systems.

To see if the computer groups would want to work with the computer again, they were asked, "Given the opportunity, I would use the computer for reading development: All the time; Some of the time; Never." Again, they exhibited positive attitudes with All the time being checked 63.6% of the time and Some of the time being checked 36.6% of the time. No one checked Never.

Discussion

While this study, because of small sample size and design limitations, can be regarded at best as a pilot for a larger, more controlled investigation, it showed some interesting trends. It validates the "direct instruction" model proposed by Pearson (1984) in that all the students improved in reading efficiency after direct, explicit exercises designed to encourage faster reading. It didn't seem to matter whether they read the selections on the screen or in traditional text form; the practice in reading whole-text passages under self-controlled, timed conditions, appears to increase college students' reading efficiency.

While we tried to minimize the Hawthorne Effect by telling the class on the first day that we would have to divide into two groups for the rate component because of computer lab limitations, those students in the computer group may have felt "special." This may have accounted for the higher,

although not statistically significant, post-test scores for the computer group. Also, we tried to control for Hawthorne by embedding questions about rate in the general course evaluation survey. Here again, the computer group gave the rate component a higher score; but when it came to rating the "method of presentation," both groups gave their mode very similar high scores (3.36 for the computer group; 3.21 for the traditional text group). It appears that these college students perceived direct practice with whole-text rate exercises helpful, regardless of delivery mode.

We recommend that this study be replicated with larger samples, under more controlled conditions. Furthermore, we recommend that a rate component, consisting of the reading of whole-text selections under self-controlled, timed conditions, followed by a simple comprehension check and the self-recording of efficiency rates on graphs or charts, be an integral part of college reading courses.

References

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Appendix A

College Reading and Rate Improvement

Evaluation Survey

RLA 399 COLLEGE READING AND RATE IMP.

Evaluation Survey

Check one: ____ _ Computer Text _____ Traditional Text

A. To what extent do you think this course has helped you to improve.	Very Greatly	Greatly	To some extent	Not at all
1. General comprehension:	1.			
Comments:				
2. Study skills:	2.			
Comments:				
3. Rate of reading:	3.			
Comments:				

B. To what extent did you find the following helpful?	Very Helpful	Helpful	Of some help	Of no help
1. Text	1.			
Comments:				
2. Novel (The Jungle)	2.			
Comments:				
3. Newspaper Reading	3.			
Comments:				
4. Rate exercises	4.			
a. Content of exercises	4a.			
Comments:				

over

b. -Method of Presentation	Very 4b. Helpful	Helpful	Of some Help	Of no Help

(Computer Text or Traditional Text)

Comments:

Suggestions: (Please make any suggestions you may have about the rate component)

For Computer group only:

Given the opportunity , I would use the computer for reading development.	All the time	Some of the time	Never

Comment on any difficulties you might have had in working with the computer: